“A STUDY ON ECTOPARASITES (TICKS AND FLIES), THEIR EFFECTS AND CONTROL MEASURES IN COWS IN TQ. DEGLOOR DIST-NANDED, MAHARASHTRA”

A Synopsis submitted for Ph.D. Registration in Zoology

Submitted to

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Abstract:

The farmers in India mostly practice a mixed farming system that is a union of crop and animal husbandry. The domestic animals such as cows and buffaloes provide consistent income to the people through the sale of milk. Ectoparasites (ticks and flies) are responsible for severe damage to many vertebrates including domestic animals such as cow which leads to anemia, weakness, disturbance and even mortality of the host animal. Ectoparasites such as Ticks, flies, mites, and lice lives on host skin for their growth, multiplication and survival. The present research will be aimed to explore 400 cows from the rural and town area for the study of ectoparasites (Ticks and Flies), their species diversity, seasonal variation in distribution, Effects on cows and Control measures in cows of Degloor Taluka of Nanded district, Maharashtra. This research will help to study the intensity of the infestation caused by Ticks and flies. This research will also study the efficacy of different control measures (Cultural, Chemical, physical and biological methods) to protect cows from Ticks and flies' infestation.

Introduction:

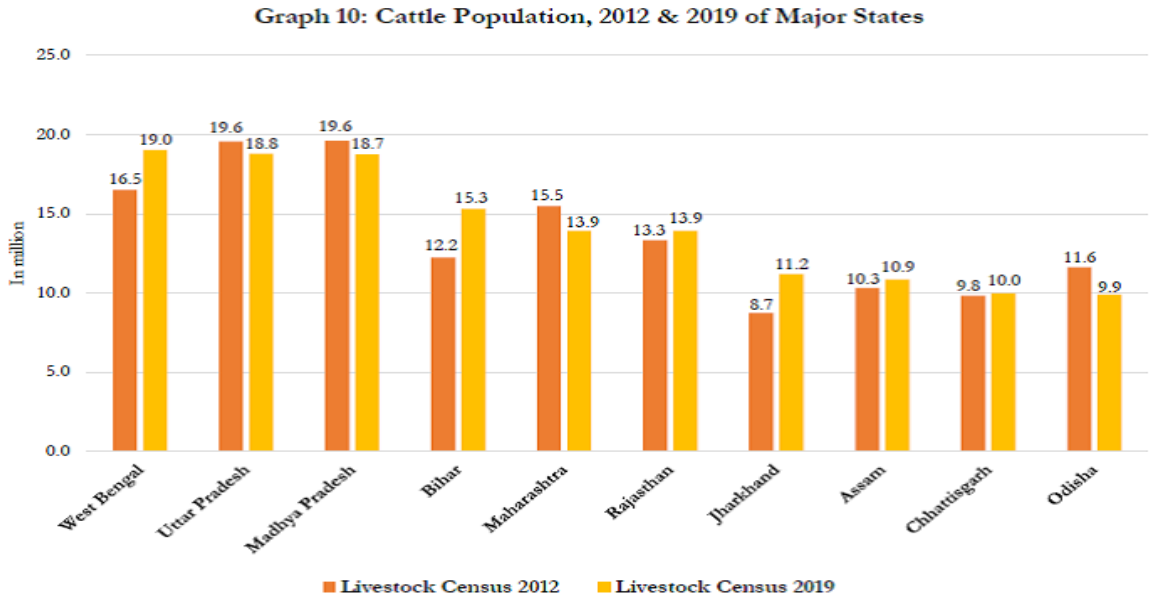
Agriculture is a backbone of the Indian economy. Agriculture with cattle breeding is the largest income source of the Indian population. The ministry of Agriculture and farmers welfare, Government of India, published an annual report (2020-21) which states that approximately 57.8 percent of its rural population directly or indirectly still depends primarily on agriculture and its allied sectors such as cattle breeding. The farmers in India mostly practice a mixed farming system that is a union of crop and animal husbandry. Cow is a crucial source of income as well as its milk is used as food source. According to livestock census the number of cows within the country is approximately 192.49 million.

The domestic animals such as cows and buffaloes provide consistent income to the people through the sale of milk. Ectoparasites (ticks and flies) are responsible for severe damage to many vertebrates including domestic animals such as cow which leads to anemia, weakness, disturbance and even mortality of the host animal. Cows and other domestic animals are more vulnerable to the attack of ectoparasites such as ticks and flies. It is very necessary to use control measures to protect animals from the attack of ectoparasites because neglecting of Ectoparasites ultimately affect the health of domestic animals and in turn reduces the income of livestock keepers.

Ectoparasites such as Ticks, flies, mites and lice live on host skin for their growth, multiplication and survival. Among these ectoparasites Ticks and flies are more widespread in the various regions of India, because of lack of awareness, unhygienic practices, insufficient and poor veterinary services, poor control measures strategies and Favorable climatic conditions for the growth of ectoparasites. Ectoparasitic (ticks and flies) infestation poses the remarkable threat to live stock health and maintenance. According to Altunsoy and Kilic (Altunsoy, 2012), weight gains in cattle may be decreased by 0.1 kg per day if the animal is attacked on a daily basis by nearly 65 blood-sucking insects. So, it is necessary to take serious action to prevent cattle from the attack of ticks and flies.

COWS

A cow is a Chordate which belongs to the class Mammalia and family- Bovidae. Instead of growing Indian cows to meet the need for more milk, Indian veterinary scientists took the simpler path by importing foreign cows and breeds. Long-term effects could be seriously harmful. According to 20th livestock census of report, the cattle population of Maharashtra state is declined so it's necessary to concern about it.



Ticks

Ticks are parasitic arthropods belonging to the class Arachnida. They are divided into two major families, the hard tick (Ixodidae) and the soft tick (Argasidae). The size of the female tick is greater compared to the male tick.

Ticks are external parasites generally referred to as ectoparasites. The larva and nymphs generally feed on larger vertebrates, including wild and domestic animals. Ticks infest birds, reptiles, amphibians and mammals and cause anemia, chronic illness, weakness and even mortality if not treated early.

Ticks are excellent vectors for various pathogenic protozoans and bacteria. Ticks cause various diseases such as Babesiosis, Bovine anaplasmosis, East coast fever, which are the most common tick-borne diseases of cattle which ultimately cause severe financial damage to livestock production.

Flies

Flies are arthropods that belong to Class- Insecta and order-Diptera. Flies head is mobile, eyes are compound, sucking and piercing types of mouthparts. Large flies such as tsetse flies, blowflies (Calliphoridae), horn flies, face flies cause significant harm to cattle leads to economic loses and decreased production of dairy.

The flies are significant vectors for spreading of disease such as transmission of bovine leucosis virus, trypanosomiasis etc. The most common neoplastic disease in cattle is caused by Bovine Leukemia Virus (BLV) and it's transmitted by horn fly.

The problem identified is ‘Insufficient data of tick and fly’s species diversity and distribution on cattle. Also, does the distribution of ticks and flies on cows vary with the season or not? The role of Cultural, biological methods to prevent ectoparasitic attack in cows need to be worked out to decide whether the cultural and biological methods are efficient to the cattle for protection from ticks and flies or not? It will give future guidelines in livestock pest management, and production.

This research will encourage innovative thinking on effect of ticks and flies on cows and control measures to be taken for better health of cattle.

Review of literature

The activities of ectoparasitic insects may create health issues to man, his livestock and wild host through disturbance, irritation, damage to skin and also act as a vector for several diseases. Research in this field is well known from cultural methods to chemical methods to control pest. (Porflrio, 2016) Studied the biological methods to control tick (Boophilus micoplus), with the help of microorganism. In India (Ronghang B., 2016) focused on status of tick infection among semi-wild cattle in Arunachal Pradesh. Comparing trap designs and methods for assessing densities of synanthropic flies. (Benavides, 2016) studied the Cattle ticks and Disease agents that Transmit in Epidemiological scenarios of climate change: Guide for Tick Management and climate change adaptation. Carlos Ramon G. J- given brief introduction on fly born diseases in animals. Khajiria, Godra, Yadav studied various strategies for Prevalence of ixodid ticks in dairy animals of Jammu region. (Khajiria V, 2015)

Bell M, Irish S. performed research on Comparing trap designs and methods for assessing densities of synanthropic flies (Bell M, 2019). Benavides studied on the behavioral patterns of Cattle ticks and Disease agents that Transmit in Epidemiological scenarios of climate change (Benavides, 2016). Carlos Raman along with other researchers studied various fly borne diseases in animals. Carlos Ramon, Juan felipe etc. recently published a chapter that describes the fly borne diseases in animals and their control strategies by adopting different protocols (Carlos Ramon, October 2021). Bruce and Decker in 1958 Studied the strategies in Fly control and their strategy help in milk flow (Placeholder1). Ghosh, Yadav in 2012, given review on the Upcoming and future strategies of tick control (Ghosh. S., 2012) . M.H.B. Kabir, Mondal, did an epidemiological survey on investigation of tick infestation in cattle at Chittagong District, Bangladesh (M. H. B. Kabir, 4 February, 2011.) Porflrio, etc. studied the biological control of Ticks with the help of microorganisms (Porflrio, 2016). Ronghang, Roy B. in 2016, studied on the Status of tick infection among semi-wild cattle in Arunachal Pradesh, India (Ronghang B., 2016). Sanjay Chaudhary, Rohit Kumar, etc. studied on flies' menaces in dairy farm and its strategies for prevention and control (Sanjay Choudhary, 2021)

Objectives:

The research entitled "A STUDY ON ECTOPARASITES (TICKS AND FLIES), THEIR EFFECTS AND CONTROL MEASURES IN COWS IN TQ. DEGLOOR DIST-NANDED, MAHARASHTRA" have the following objectives.

1. To determine species diversity of ectoparasites (Ticks and flies) and their seasonal distribution on cows of TQ. degloor, Dist.- Nanded.
2. To study the intensity of the infestation caused by Ectoparasites (Ticks and flies). and
3. To study the influence of weather on the distribution of Ticks and flies on cows.
4. To list efficacy of different control measures (Cultural, Chemical, physical and biological methods) to protect cows from Ticks and flies' infestation.

Importance of the study:

International/National Status:

The global population is increasing rapidly; this rapidly growing population requires a sustainable food. According to the Food and Agriculture Organization (FAO) despite the fact that food availability has improved over the past 30 years along with the expanding human population, 800 million people still suffer from malnutrition. This issue is brought on not just by inadequate food production and distribution. Cow is an important source of income as well as a sustainable source of food for people across the globe. India is the top most livestock owner of the world. According to the 20th Livestock Census report, the research states that from 15.12 crore in 2012 to 14.21 crore in 2019, the overall number of indigenous cattle decreased by 6%. Ectoparasite (ticks and flies) are potential disease vectors and spread a vast number of infectious diseases among cattle. Ectoparasites such as ticks and flies live on cow skin for their nutrition, maturation and multiplication. Ectoparasitic infestation poses greatest threat to health of cattle. In tropical and subtropical areas, ticks are the most significant economic pest of cattle and other domestic species.

Attack of the pest flies are one of the stressors which has economic and welfare concern in dairy cattle production systems. So, it's very necessary to study different species of ticks and flies in the degloor area Nanded district area in order to take preventive measures against them.

Limitations of research study:

This research has some limitations,

1. This Research is area specific and only limited to the Degloor Taluka, Nanded district, Maharashtra state.
2. A total 300 cows will be surveyed for ectoparasites (ticks and flies).

Study Area:

The research will be conducted in the rural and town area of Tq. Degloor, District Nanded, Maharashtra state which is the largest municipal Council in Nanded district in the state of Maharashtra. Study area is situated near the Telangana, Maharashtra and Karnataka boundaries meet. Total area of Degloor tehsil is 690 km sq including 682.80 km2 rural area and 7.41 km2 urban area consisting 114 villages.

Research methodology:

This study will be conducted in two parts and divided into following chapters

A. Collection of ticks and flies collected from cows of Degloor taluka, Nanded district.

B. Laboratory studies for taxonomic identification of ticks and flies and to study the Cultural, Physical, Chemical and biological methods to prevent and cure cows from ticks and flies.

Chapter1. Sampling of ticks and flies from cows

Study area for Field sampling: The survey of cows will be from both the rural area and town. 400 cows Will be selected randomly from rural areas and town area and ticks and flies will be collected.

The samples will be collected from the 30 different villages and town itself of Nanded District, Maharashtra. Selected villages will be visited monthly for observations of cows for Ticks and Flies, intensity of Infestation will be studied and sample will be collected.

Methods of data collection:

Collection of ticks

The ticks are large enough to see with naked eyes.

The ticks will be collected by handpicking and dragging methods.

Collection of Flies

The best method of collecting flies is by searching for them visually and catching the discovered Specimen with a net or trap. Blue sticky card traps can be recommended for the capture of domestic fly species as they are easy to use, readily allow for species identification, and collect sufficient Quantities of flies over 12 hours for use in Monitoring and control programs. (Bell M, 2019)

Chapter2. identification of ticks and flies and Statistical analysis

Identification of ticks collected from cows.

The identification of ticks will be done with the help of keys given by Dhanda and Raja (1974) and Dhanda et al (1977).

Identification of flies collected from cows.

Using different keys for identification of flies will be used. To identify the flies pests, online data available on the websites for farmers and researchers will be used for identification of flies.

Flies will be taxonomically Classified according to the species Identified species will be cataloged with Their species and hosts organ specificity. The type of species will be preserved as registered Flies Collection In the Department of Zoology, N.E.S. Science College, Nanded.

Preservation of ticks:

For laboratory study, the ticks will be preserved with the help of preserving agents. The standard way to Preserve ticks is in liquid, mostly 70-80% ethanol, ideally in good vials with proper labeling.

In this way the ticks will be preserved in 70-80% ethanol in vials.

Preservation of Flies:

The collected flies will be preserved in liquid, containing 70% ethanol in vials with proper labeling.

Statistical Analysis:

Biodiversity of ticks and flies will be studied with the help of biodiversity indices Such as Shannon diversity index, Simpson diversity along with the use of different software's.

Rarefaction method will be used for comparing the species richness and seasonal diversity of Ticks and Flies on cows.

To describe control measures, infested cows will be studied on the basis of different applied control Measures to tackle ectoparasites in cows.

Proposed work plan-with a tentative chapter

Eight separate chapters will be used to organize the current study.

1. Introduction

It consists of an introduction about the position of a cow in the livestock economy, Introduction about ticks and Flies, disease caused by ticks and flies.

2. Review of literature

A literature review is an overview of the previously published works on particular topic. Literature reviews are Secondary sources. The research articles, books, journals, conferences, internet sources which will be used for review of literature. This includes the secondary sources related to the present research.

3. Materials and methods

The materials are simply the raw materials, tools, important chemicals used in your experiments, and study Area. It will consist of the geographical location and climate of Degloor, district Nanded, Maharashtra. Field investigation, selection of cows, survey of ectoparasites, collection methods for ectoparasite, Seasonal weather conditions, observation and identification of ticks and flies, Preservation of ticks and flies.

The Research methods

It describes all the steps or procedures done in order to achieve the research objectives, including the Experimental design and data analysis. It will consist of different statistical methodologies which will be used in research. It will contain the effect of ticks and flies on the behavior of cows and their control measures.

4. Observation

It will consist of Meteorological observations, breeds of infested cows, particular of cows, particular of cows With body parts, particular ticks and flies. It will also consist of a percentage of infestation in cows etc.

5. Results and discussion.

It will consist of the results obtained from the research, and the control measures to prevent cows from Ticks And flies. The behavior of cows that are infested with parasites will also be described.

6. Summary and conclusions

A summary is a condensed version of a literary work that expresses the important ideas clearly. Research summary is a piece of academic writing that succinctly and precisely informs a specific Audience on the findings of a research study. A conclusion is the final decision or judgment that is made After careful thought.

7. Bibliography

All the reference material which will be used for study will be separately mentioned in this chapter.

8. Appendix

An appendix is the part of a research paper that contains documents and references that may be very detailed And too large.

Year wise work plan for the research

Months	Work Plan
00-06	Review of literature, Procurement of equipment
06-30	Collection of samples, Identification, Preservation, behavioral study of host and Publishing research papers.

30-36	Data Collection and statistical interpretation, Writing of Thesis

Possible outcomes from the research

1.The Species diversity of ticks and flies as tools in Integrated Pest Management (IPM) will be identified for Protection of cows from subsequent losses.

2. This research will help to study the effects of ticks and flies on the behavioral patterns of cows.

3. Livestock keepers will be advised to protect their cows from ectoparasites (ticks and flies), and to maintain Hygienic conditions.

4. The study will be beneficial to farmers because they will learn the harmful effects of ectoparasites and also Raise awareness about their cattle's health.

5. Environmental degradation due to the use of acaricides and insecticides may be controlled and Managed by practicing biological and cultural methods of tick and fly control.

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